

U.S. Patent Application Serial No. 09/926,160
Response filed November 22, 2004
Reply to OA dated August 10, 2004

REMARKS

Claims 1 and 5-8 are pending in this application. An amendment to claim 1 is presented in order to more particularly point out, and distinctly claim the subject matter to which the applicants regard as their invention. The applicants respectfully submit that no new matter has been added. Entry of the amendment is respectfully requested. It is believed that this Amendment is fully responsive to the Office Action dated **August 10, 2004**.

Support for the amendment to claim 1 may be found on page 8 of the specification, lines 4 to 3 from the bottom of the page.

Claims 1 and 5-8 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. 6,316,089 to Ohtani et al. in view of U.S. 5,847,036 to Takabatake et al. as set forth in section 4 of previous Office action. (Office action paragraph no. 2)

The rejection is overcome by the amendment to claim 1. In the amendment, the polymer (b) has been limited such that “the particle diameter of the polymer (b) is 300 to 5000 Angstroms (Å).” Applicant submits that this limitation is not taught or suggested by the cited references, the teachings of which are discussed below.

Regarding Ohtani et al. (US 6,316,089)

To illustrate the difference between the present invention and Ohtani et al., the following table compares the present invention and Example 2 of Ohtani et al.

The Present Invention	Ohtani 's Example 2
(e) unsaturated polyester, vinyl ester	unsaturated polyester (Rigolac FK-2000)
(a) acrylic type polymerizable monomer, SP-8.1 to 10.0	styrene monomer (column 10, lines 20 to 27)
(b) High molecular weight polymer having a weight average molecular weight of 100,000 or more and that can be obtained in powdered form, consisting mainly of either polymethyl methacrylate or methyl methacrylate and which dissolves or swells, (a) the content is 10 to 50 parts by weight relative to 100 parts by weight of the monomer and <u>the particle diameter of the polymer is 300 to 5000 Angstroms</u>	visible light absorbing dye 0.03 parts organic quaternary boron compound (BP3B) 0.12 parts low-shrinkage agent (such as the example polymethyl methacrylate)
(c) photocuring agent	photocuring agent (visible light polymerization initiator I-1800) 1.0 part
(d) fibrous reinforcement photocurable sheet-form material	fibrous reinforcement photocurable prepregged sheet

Ohtani et al. (column 22, line 15) discloses polymethyl methacrylate as an example of a low-shrinkage material that may be contained in the composition. Ohtani, in column 22, lines 19 to 23, discloses: "Amounts in excess of 40 parts by weight results in degraded moldability due to excessively high viscosity, and in addition, decreases in smoothness of the surface of the cured product and in heat resistance." On the other hand, in the present invention, polymer (b) is added to increase the viscosity, which is a different purpose than acting as a low-shrinkage agent.

A polymethyl methacrylate used as a low-shrinkage agent is normally polymerized by the **suspension polymerization method**. This point is widely known, as supported by a definition of

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“suspension polymerization” from a chemical dictionary (*Dictionary of Chemistry 3*) listing the example of polymerization of polymethyl methacrylate. (See attached copy of reference.)

The present specification, on page 8, lines 9 to 3 from the bottom, discloses that polymer (b) of the present application is usually produced in an emulsion form by **an emulsion polymerization method**, with the emulsions having a particle diameter ranging from 300 to 5000 Å (30 to 500 μm). As disclosed on page 9 of the specification, lines 2 to 4, during drying, the particle diameter ranges from 20 to 100 μm even when aggregated, being understood to be the particle diameter in the emulsion polymer.

In the present amendment to claim 1, the particle diameter is limited to 300 to 5000 Å, thereby distinguishing from Ohtani et al. The polymethyl methacrylate of Ohtani et al. is an ordinary one, and therefore would be obtained by **suspension** polymerization. Such a polymethyl methacrylate has a particle diameter of 1 mm or more, and there would be no overlap of the size of Ohtani's polymer with the claimed range for polymer (b).

Also, Ohtani et al. discloses that thickening is performed by prepolymerization with a specified visible light absorbing dye and visible light polymerization initiator (column 5, lines 6 to 17), while in the present application viscosity increases by swelling and dissolving of the polymer (b). Since the present invention does not involve photopolymerization as in Ohtani et al., it has the advantage of thickening being easy to control.

Further, Ohtani et al., in column 10, lines 20 to 27, makes no disclosure of the use of “an acrylic type polymerizable monomer with an SP of 8.1 to 10.0” as recited in claim 1. In fact, there

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appears to be no mention of the SP value, and therefore no teaching or suggestion for any value for this parameter.

Moreover, Ohtani et al., in column 10, lines 4-5, lists only a styrene monomer as the possible polymerizable monomer. Example 1 of Ohtani et al. discloses a nonstyrenic resin but is unclear about the monomer. The present rejection is based on substitution of the "styrene monomer serving as reactive diluent" in Ohtani et al. by an acrylic type monomer, but Applicant submits that there is no clear suggestion in the reference for this substitution.

Regarding Takabatake et al. (US 5,847,036)

Takabatake et al. relates to an acrylic molding material with aluminum hydroxide blended as a filler in a resin composition called an acrylic syrup (comprising an acrylic polymer and acrylic monomer).

Accordingly, Takabatake's invention differs in particle diameter from polymer (b), "a polymer which is either polymethyl methacrylate or a polymer consisting mainly of methyl methacrylate units ... produced in a powdered form having a weight average molecular weight of 100,000 or more, and wherein the particle diameter of the polymer (b) is 300 to 5000 Angstroms (\AA)" of claim 1, as amended.

Takabatake et al. (column 4, lines 27 to 34) discloses that "bulk polymerization is preferable due to the good thickening condition of the resulting molding material"; that is, the (meth)acrylic polymer of Takabatake et al. is produced by **bulk polymerization**. It is common technical

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knowledge that **the polymer of the present invention having a particle diameter of 300 to 5000 Angstroms cannot be obtained** by the manufacturing method of Takabatake et al.

Applicant notes that Takabatake et al.'s polymer is not an unsaturated polyester resin, which is one of the possible components (e) of the present invention, in addition to differing from polymer (b) of the present invention.

Moreover, Takabatake et al. does not disclose that the polymer works as a thickener when producing a molding material.

Therefore, Takabatake et al. does not disclose or suggest a component consistent with polymer (b) of the present invention. Moreover, regarding a photocurable sheet, Takabatake et al. makes no disclosure or suggestion in relation to the SP value of (a).

Regarding the combination of Ohtani et al. and Takabatake et al.

As noted above, neither Ohtani et al. nor Takabatake et al. discloses the limitations of polymer (b) of claim 1, as amended. In addition, neither reference discloses or suggests the SP value recited in claim 1, and Applicant has noted that the Ohtani does not appear to suggest that the styrenic monomer as reactive diluent be substituted by an acrylic monomer.

In addition to these points, Applicant notes that the object of the present invention is to "provide a sheet-form material which is excellent in productivity, handleability and photocurability," an object not disclosed in Ohtani et al. and Takabatake et al.

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In light of the above differences, Applicant submits that a photocurable sheet such as that of the present invention which is excellent in productivity, handleability and photocurability could not be obtained even by combining the teachings of Takabatake et al. with those of Ohtani et al..

Applicant therefore submits that the present claims, as amended, are novel and non-obvious over Ohtani et al. and Takabatake et al., taken separately or in combination. Entry of the amendment and reconsideration of the rejection are respectfully requested.

In view of the aforementioned amendments and accompanying remarks, claims 1 and 5-8, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

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In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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23850

PATENT TRADEMARK OFFICE

Enclosure: Copy of "Dictionary of Chemistry 3"; Dictionary of chemistry editorial committee, publ. Kyoritsu Shuppan Co., Ltd., pp. 456-457 with partial translation.
Petition for Extension of Time

HA\FLOATERS\DAG\DAG\01\011145\amendment nov 2004



An English Translation of Reference

Dictionary of Chemistry 3

Editor: Dictionary of chemistry editorial committee

Publisher: Kyoritsu Shuppan Co., Ltd.

Suspension polymerization: A polymerization method in which a monomer is dispersed in a medium (mainly water) that does not dissolve the monomer at all or hardly dissolves it and, using a polymerization initiator that is hardly soluble in the medium and easily soluble in the monomer, a polymerization reaction is initiated within small droplets of the suspended monomer. The polymerization takes place in the shape of the dispersed droplets, with the eventual polymer often obtained as beautifully transparent particles or pearl shaped, leading to this polymerization method also being called particulate polymerization or pearl polymerization. The monomer is dispersed by mixing in water and an ordinary dispersion stabilizer or auxiliary stabilizer is added. In emulsion polymerization, various processes such as salting out, cleaning, dehydration and the like are required when removing a polymer from a polymer latex. However, in suspension polymerization, the polymer particles sink when mixing is stopped, simplifying the separation operation. A highly stable polymer is obtained with only small impurities in the generated polymer, making fabrication also easy. The size of the obtained polymer particles is inversely proportional to the mixing speed. Stabilizers are broadly classified into water soluble polymers and hardly soluble, finely powered inorganic compounds. The former include gelatin, tragacanth gum, starch, methy-cellulose, carboxymethylcellulose, polyvinyl alcohol, polyacrylate, while the later include barium sulfate, calcium sulfate, barium carbonate, calcium carbonate, magnesium carbonate, calcium phosphate, talc, bentonite, diatomaceous earth, clay and the like. Usable catalysts are mainly those insoluble by water and easily soluble by monomers, with highly active catalysts such as benzoyl peroxide and 2,2- azobisisobutyronitrile well suited. The polymerization mechanism is simple compared to emulsion polymerization, being essentially the same as bulk polymerization, with the speed format also identical for both. However, in the case of bulk polymerization, the polymerization reaction does not proceed uniformly due to a rise in viscosity of the entire system and internal reaction heat, making temperature adjustment difficult. By contrast, in suspension polymerization, heat can be easily removed by the catalyst, making it suitable for industrial polymerization reaction, and there are no difficulties involving



mixing. However, as shown in the following table, a polymer with as high a degree of polymerization as in emulsion polymerization is not obtainable. Vinyl chloride, styrene, methyl methacrylate are polymerized by this method.

Comparison of polymerization methods

Type of Polymerization	Polymerization method	Catalyst	Temperature control	Polymerization speed	Polymerization degree	Polymerization shape
Bulk polymerization	Monomer only	Monomer dissolvable	Extremely difficult	Large	Large	Lump shaped
Solution polymerization	Monomer + catalyst	Solvent dissolvable	Difficult	Small	Small	Paste shaped
Emulsion polymerization	Water + emulsifier + monomer	Dissolvable in water	Easy	Extremely large	Extremely large	Latex shaped
Suspension polymerization	Water + monomer	Monomer dissolvable	Easy	Large	Large	Pearl shaped

化学大辞典 3

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あるものは有機物質の構成元素を抽出し、その抽出を促める方法、無機化合物はそのイオンを分析すれば元の化合物を知ることが比較的容易であるが、有機化合物は炭素、水素および酸素を主体としていて一連の化合物であるので、その構成元素である炭素、水素あるいは酸素を抜き、そしてその元の化合物を判別することはできず、そこでこの元の化合物の場合には、その成分元素の百分率を求めて、この結果から分子式を導き、その上で元の化合物を判別しなくてはならぬ。このように有機化合物の分析は、炭素成分元素の百分率を単独に求めてゆかなければならぬので、元素分析あるいは連成分析と称される（→イオン、塩基、酸、炭素、炭素、有機分析）。これに対して、ある物質を元のままでバラバラに分解せずに、存在しているのまゝの状態を分析しようとする分析を近成分析とよぶことがある（→X線分析）。石灰元素分析に關しては石灰の項を参照。

(五、五、五)

げんそんな減損【英depletion】核反応または同位体分壊の結果、ある元素について特定同位体の存在量が減少することをいう。たとえばは普通ではウランの場合に使用される。たとえば原子炉の中で核分裂などの核反応を起こすと、 ^{235}U がいわゆる燃焼を起こすと、 ^{235}U の量が減って ^{235}U と ^{238}U の比が小さくなる。これが原因である。また同位体分壊現象を用いて ^{235}U と ^{238}U の分離を行なうと、一方では濃縮された濃縮ウランができるが、一方ではウランが（多少なりとも）除かれた脱ウランをリサイクルして生ずる。この場合には濃縮は濃縮に對することばである。（坂田忠之）

げんそんうらん 減損 — [英depleted anium] ^{35U}の含有量が減少したウラン。
、減損

けんたい、検体 [test sample, test body, test substance 試体] 試料に対し特に物に聚学、

けんだくえき懸濁液 [英 suspension
液体中に固体の微細粒子が分
散したものをいう。粒子は重力的沈降速度に
括弧附随するが、粒子が微細なものは沈降速
度おそく、比較的長く分散状態が保たれる。通
常防凍液という場合はアルミナや炭酸カルシウ
ムの粗粒のものを用い、粒子が内眼または顕微鏡で見
ても含めてよぶこととある。(西岡ヨロイド)

さんだくコロイド懸濁——懸濁質 [英]
 suspensoid, suspension colloid 懸濁質
 液体中に固体コロイド粒子が不定に
 かんんでいていう。懸濁液とよぶ場合も
 ある。金、水酸化鉄、イオウなどのゾルはこ
 のである。これをつくるには分散法、凝集法。

などの特別な方法をとらねばならない。また、いったん生じたものも一般に不安定で凝結しやすいく、長時間保存するたためには安定剤が必要である。野瀬コロイドはそれまででは一般に不可逆コロイド*である。

(牛原文雄)

けんだくざい、懸濁剤 [英 suspension
Suspension 露 Suspensiones] 液(主として水)中に不溶性の固形薬品を均等に分散させた剤形である。通常、この分散を均一に、かつ安定にするため添加する物質を懸濁化剤(suspending agent)といい、広く用いられるものにはアラビアゴム、トラガカントガム、アルギン酸、カルボキシメチルセルロース、メチルセルロースなどがあるが、時に、単シロップ、グリセリンも用いられる。如例：(日本薬師協会調剤技術委員会編、調剤指針) 硫酸バリウム150g、カルボキシメチルセルロース2.0g、溶性サッカリン0.04g、レモンエッセンス1cc、水350cc(市販製剤)。

けんだくしつ suspension colloid
懸濁質 [英 suspension, sus-
pension] 懸濁液

けんだくじゅうこう 懸濁重合, suspension polymerisation
 懸濁重合 (suspensions polymerisation) 単重合を全
 く溶解しないか、またはほとんど溶解しない媒
 質中(主として水)に単重合体を分散させて、媒体
 に懸濁して単重合体の易溶性の重合開始剤を用い、
 分散した単重合体の小い滴内で重合反応を進行
 させる重合方法で、分散した小滴の形態のまま
 で重合が進行し、後後の重合物が集まり透明な
 凝りない真珠状としてえられる割合が多いの
 で、この重合法を粒状重合*またはパール重合
 とよぶこともある。単重合体を水中へかきまぜ
 て分散させ、通常分散の安定剤、補助安定剤を
 添加する。乳化重合*では重合物ラテックスか
 ら重合物を取り出す際に、蒸析、洗浄、脱水、
 乾燥などの工程が必要であるが、懸濁重合で
 はかきまぜるのを止めることと重合体粒子が沈降する
 か分離操作がきわめて簡単であり、生成重合体
 の不純物がわずかで、安定度の高い重合体が
 得られ、成形加工も容易である。得られる重合
 体粒子の大きさは、かきまぜる速度に反比例す
 る。安定剤として用いられるものは、水溶性高
 分子と不溶性の微粉状の無機化合物に大別さ
 れ、前者にはゼラチン、トラガカンゴム、デッ
 シン、メチルセルローズ、カルボキシメチルセ
 レン、ポリビニルアルコール、ポリアクリ
 ル酸塩などが属し、後者には硫酸バリウム、硫
 酸カルシウム、炭酸バリウム、炭酸カルシウム、
 硫酸ナトリウム、リン酸カルシウム、タルク、
 マグネシア、ケイソウ土、粘土などが属す。
 いられる媒質としては、もっぱら、水不溶性

で半量、容易溶解性のものが用いられ、過酸化ベンゾイル、2,2'-アゾビスイソブチロニトリルなどの活性性の大きい触媒がよい。重合機構は乳化重合の特性に比し、簡單で、本質的には塊状重合と同様で、速度式も両者は同一である。ただ塊状重合の場合には系全体の粘度の上昇や内部反応の進行のために、重合反応が均一に進まず、その温度調節がにくいのが、懸濁重合では媒体によって容易に除去されるので工業的規模の重合に反応に適し、かきまぜの困難もない。しかし、系全体が液体のように乳化重合のように重合時の高い粘度は得られない。塩化ビニル、スチレン、メタクリル、アクリルメチルなどはこの方法で重合する。

[illegible]

けんだくしゅうほう 懸濁床法 [suspension bed process 懸濁床法] 1

けだんぐぶくしつ 懸濁物質 [英 suspended matter, suspended particle 德 suspendiertes Stoff] 水中に浮遊している微小物質のこと。の兩り度*の原因となるもので、溶解物質*に照する。水を使用する際懸濁物質は一般に好まれない。たとえば飲料水*としては懸濁物質に含まれる微生体、有機物の存在が不適当であることは当然であるが、工業用水*としても、たとえは製紙工場の用水は紙の光沢を損じ、汚染水をガラスフィルタ*でろ過して測定した。懸濁物質の除去は沈降分離、ろ過によつてなう。すなわち貯水池で自然沈降させるか、または凝結剤を加えて分層し、なお愛る懸濁質は砂ろ過で除く。→セクション(山梨貯水池)

けんたく(ほう) 懸濁法 (suspension)
 飼料粉末または粉体の密度を、比
 較的既知の溶液に溶解させることによつて決定す
 る方法に依る。此既知の溶液として用いられ
 るものにローレル油液¹⁾(d 3.58), チール
 トール油液²⁾(過塩素酸鉛置換油液, d
 3.6), あるいはゼラチン液³⁾(ヨウ化水銀カク
 の濃厚溶液, d 3.17) などがある。密既未知
 の飼料粉末(固液)と化学反応を起こさないもの
 (試料)を種々の比重をもつ重液に加え、そ
 の浮沈の判断から大約の密度を求める。比重選
 別に用いられる。
 (試料第一号)

ケンタニウム [≒Kentanium] 一 錠結炭
化物合金

ケンダル KENDALL, Edward Calvin
1886. 3/3〜、アメリカの生化学者。Connecti-
cut 州 South Norwalk の生れ。Columbia 大
学より学位を得る。1910〜1911 年 Detroit の
Parke Davis 会社の研究化学者、1911〜1914
年 New York の St. Luke 病院に勤務。この間
甲狀腺に関する研究を続けた。1914 年 Ma-
yso 診療所生化学部長、1945 年より生化学図書
委員、Mayo Foundation 生理化学教授。1915
年甲狀腺の活性成分チロキンを分離し、グ
ラハルチオンを結晶させ、化学的性質を確定し
る。20 年近くも副甲状腺ホルモンに類する
研究を行ない、種々な化合物を単頒、同定し、
ニルチラザンの部分合成に成功。また 1949 年リ
ンマチその他の病変に対する使用について報告
した。1921 年 John Scott 賞、1925 年 Chandler
Medal、1945 年 Squibb 賞、1949 年 P. S. Hench
とともに Lasker 賞、その他多くの賞と名誉学
位を受け、種々な科学会会員となる。1950 年
ベル医学生理学賞を受賞。
「山下 25」

ケンダルのかごうぶつ E.C. Kendall が副シ
 Kendall's compound) E.C. Kendall が副シ
 皮質から単離した化合物。

ケンダルの化合物 A = 11-デヒドロコルチ
コステロン

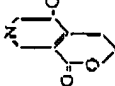
—B == コルチスコステロン
 —C == アロプレグナン-3 α . 11 β . 17 α .
 21-テトロール-20-オン
 —D == アロプレグナン-3 β . 11 β . 17 α .
 20 β . 21-ペントル
 —E == コルチゾン
 —F == ヒドロコルチゾン
 —G == アロプレグナン-3 β . 17 α . 21-
 リオール-11, 20-ジオン
 —H == アロプレグナン-3 β . 21-ジオー
 ル-11, 20-ジオン

(昭和三年刊)

ケンタレンがん 一岩 [Kentallenite
Kentalenit] カンラン石を含んだモンゾ
岩の一類。スコットランド Argyllshire 地方
Kentalen を産産地とする。1900 年 J. B. Hill
H. Kynaston が命名した。→モンゾ一岩
(岩類記述)

ゲンチアナン — 根 [Gentian root
Enzianwurzel] → リュウタン

ゲンチアニン [1] { gentianine 塩
ntianin} $C_{16}H_{25}NO_5 = 175$. センブリ *Swer-*
tia japonica Mak. の全草。
リンドウ *Gentiana scabra*
BG. var. *Buergeri* Maxim
の根など、リンドウ科の植
物に分布しているアルカロ
イド。性質 白色針状晶(石油ベンジンから再



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